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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
XU, KEVIN K	

ART UNIT	PAPER NUMBER
2676	

DATE MAILED: 12/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/825,235	LI, HAN-ZHOU	
	Examiner	Art Unit	
	Kevin K. Xu	2676	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 Aprifl 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 10825235.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities: Paragraph 3 includes the phrase "100 x 100 points totally" and "100 points totally", which renders the specification somewhat vague and thus appropriate correction is required. It is recommended the applicant change the wording of the specification to "100 x 100 points total" and "100 points total". Furthermore, Paragraph 5 contains the misspelling of the word "edge" in "edge-point" and paragraph 10 contains the misspelling of the words "points into". Appropriate correction is required.

Claim Objection

Claim 2 objected to because of the following informalities: the word "vertical" is misspelled. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 12-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauregard. (5710578).

Beauregard teaches a method of filling a closed region by showing a system and method for filling in the area defined by the boundaries of a polygon that is being displayed on a graphical raster display system (Col 1, lines 18-20); said method

wherein the closed region is enclosed by a contour formed by a plurality of edge points by showing points 130 of polygon 120 (Col 7, lines 30-32 and Fig. 12); said method wherein each of the edge points has a previous edge point and a next edge point according to its order in the contour (Fig. 12); said method comprising generating a path linked list comprising a plurality of intermediate points between the edge points on the contour by showing traversing the polygon 120 counterclockwise 26 starting with line 121 (Fig. 12), the x value at pel 42 would be stored at the max entry 107 for the y entry 103 at y=11 representing scan line 132 for y=11. (Col 10, lines 53-56 and Fig. 12) For the next scan line 132 of y=12, the value of pel 44 (Fig. 12) would be stored at the maximum entry 107 for the y entry 103 of y=12. (Col 10, lines 56-58 and Fig. 12) This is repeated for each scan line 132. Likewise, traversing the polygon 120 down from vertex 2, the minimum value for a pel 130 at a scan line 132 would be stored in the minimum entry 106 for the corresponding y entry 103. (Col 10, lines 58-62 and Fig. 12). Lastly Beauregard teaches generating a filling array linked list according to the path-linked list by explaining traversing up the polygon 120, both values of the first pel 41, 43, 45 and last pels 42, 44, 46 on each scan line 132 respectively are stored. (Col 16, lines 9-11 and Fig 12) When this is completed the B **array** 112 is filled with both minimum and maximum values of x for each scan line 132. (Col 16, lines 11-13 and Fig 11 and 12) Traversing down the polygon 120, the minimum and maximum values of x for each scan line 132 are stored in the A array 111. (Col 16, lines 11-13 and Fig 11 and 12). However Beauregard fails to explicitly teach recording a plurality of filling line segments, wherein the two end points of each filling line segment are located on the

contour while these filling line segments are located within the closed region and filling the closed region according to these filling line segments. Nonetheless Beauregard teaches all polygons can be filled with this second polygon fill algorithm if the polygon can be filled with exactly **one continuous line per scan line** (Col 4, lines 27-30) and there is a set of scan lines 132 representing each sequential row or pels 130, 131 in the y direction 102 (Col 7, lines 36-38 and Fig 12). Furthermore Beauregard teaches that for each scan line 121, 122, 123, 124 of the polygon 120, points 130 are generated on one scan line 132 at a time. (Col 7, lines 38-40 and Fig 12). Consequently it is well known in the art that a scan line 132 by definition is a horizontal line (a row) in a video frame for raster displays and therefore can be recognized as a filling line segment wherein two end points of each filling line segment are located on the contour while these filling line segments are located within the closed region. (Fig. 12) Therefore it would have been obvious to one of ordinary skill in the art at the present time the invention was made to utilize a set of scan lines as taught by Beauregard within generating a filling array linked list in order to store two minimum and maximum values for each scan line of a polygon (Col 3, lines 14-15) and thus, the polygon is filled by scanning the array and drawing a line from the minimum to the maximum value stored for each y value. (Col 5, lines 16-17)

Regarding claim 12 and 13, Beauregard teaches the said method wherein the filling array linked list has a plurality of line segment linked lists wherein each of these line segment linked lists is used for recording one of these filling line segments and wherein these filling line segments are horizontal by explaining traversing the polygon

120 counterclockwise 26 starting with line 121 (Fig. 12), the x value at pel 42 would be stored at the max entry 107 for the y entry 103 at y=11 representing scan line 132 for y=11. (Col 10, lines 53-56 and Fig. 12) For the next scan line 132 of y=12, the value of pel 44 (Fig. 12) would be stored at the maximum entry 107 for the y entry 103 of y=12. (Col 10, lines 56-58 and Fig. 12) This is repeated for each scan line 132. Likewise, traversing the polygon 120 down from vertex 2, the minimum value for a pel 130 at a scan line 132 would be stored in the minimum entry 106 for the corresponding y entry 103. (Col 10, lines 58-62 and Fig. 12)

Regarding claim 14, Beauregard teaches the filling method according to claim 13, wherein, in the step of generating the filling array linked list, the intermediate point in the path linked list is recorded into its corresponding line segment linked list according to the vertical coordinate of the intermediate point by showing traversing the polygon 120 counterclockwise 26 starting with line 121 (Fig. 12), the x value at pel 42 would be stored at the max entry 107 for the y entry 103 at y=11 representing scan line 132 for y=11. (Col 10, lines 53-56 and Fig. 12) For the next scan line 132 of y=12, the value of pel 44 (Fig. 12) would be stored at the maximum entry 107 for the y entry 103 of y=12. (Col 10, lines 56-58 and Fig. 12) This is repeated for each scan line 132. Likewise, traversing the polygon 120 down from vertex 2, the minimum value for a pel 130 at a scan line 132 would be stored in the minimum entry 106 for the corresponding y entry 103. (Col 10, lines 58-62 and Fig. 12) It should be observed that pels 41-46 are examples of intermediate points in Fig. 12.

Regarding claim 15, Beauregard teaches the filling method wherein in the step of generating the filling array linked list, the edge point in the path linked list is recorded into its corresponding line segment linked list twice according to the vertical coordinate of the edge point if the vertical coordinate of the edge point is greater than that of both the previous edge point and the next edge point by showing the fill algorithm **stores both a minimum value and maximum value for each scan line** of the polygon for each line of the polygon. (Abstract) Furthermore, Beauregard teaches the next step, line 5109 (Fig. 5B) is the y high test. If the new y is higher than the previous y max, the y max is updated to the new value. The index where the new y max (Fig. 11) was found is stored and the same is done with the minimum. (Col 11, lines 35-38 Fig 5B, Fig 11 and Fig. 12) Furthermore, it is well known in the art that recording a corresponding line segment linked list **twice** according to the vertical coordinate of the edge point if vertical coordinate of the edge point is greater than that of both the previous edge point and the next edge point is equivalent to storing both a minimum value and maximum value for each scan line and appropriately updating a new y maximum as taught by Beauregard.

Claim 16 is similar in scope to claim 15 and thus is rejected under similar rationale.

Regarding claim 17, Beauregard teaches the filling method wherein the filling array linked list further comprises a horizontal linked list for recording at least one horizontal line segment on the contour by showing each table 111, 112 has minimum 116 and maximum 118 values in the x direction 104 for each scan line 132 in the y

direction 102. (Col 8, lines 26-31 and Fig. 11 and Fig. 12) Therefore it is well known in the art that recording values in the x direction for each scan line on the polygon is analogous to recording a horizontal line segment on a contour.

Regarding claim 18, Beauregard teaches the filling method wherein in the step of generating the filling array linked list, the edge point in the path linked list is recorded into the horizontal linked list of the filling array linked list if the edge point forms the horizontal line segment together with either the previous edge point or the next edge point by line 6060 of the genline algorithm 60 covers the special case where the line of the polygon 120 is horizontal. (Col 13, lines 3-4 Fig. 6A, Fig. 10 and Fig. 12) If the first y is equal to the second y, then there is a horizontal line. If on the horizontal line x2 is greater than x1, all the points are on the same scan line, and the implementation of the Bresenham algorithm is not needed. In this case the greatest value of x, x2, is stored as x max. If x2 is less than x1, the line lies in either octant III, IV, V, VI and the smallest value of x, x1, is stored as x min 106. (Col 13, lines 4-11 and Fig. 6A, Fig 10 and Fig. 12)

Regarding claim 19, Beauregard teaches said filling method wherein generating the filling array linked list, the edge point in the path linked list is recorded into its corresponding horizontal linked list according to its vertical coordinate if the edge point forms the horizontal line segment together with the previous edge point by explaining traversing the polygon 120 counterclockwise 26 starting with line 121 (Fig. 12), the x value at pel 42 would be stored at the max entry 107 for the y entry 103 at y=11 representing scan line 132 for y=11. (Col 10, lines 53-56 and Fig. 12) For the next

scan line 132 of y=12, the value of pel 44 (Fig. 12) would be stored at the maximum entry 107 for the y entry 103 of y=12. (Col 10, lines 56-58 and Fig. 12) This is repeated for each scan line 132. Likewise, traversing the polygon 120 down from vertex 2, the minimum value for a pel 130 at a scan line 132 would be stored in the minimum entry 106 for the corresponding y entry 103. (Col 10, lines 58-62 and Fig. 12) It should be noted that repeating for each scan line encompasses edge points.

Regarding claim 20 Beauregard teaches said method wherein, in the step of generating the filling array linked list, the edge point in the path linked list is recorded into its corresponding horizontal linked list according to its vertical coordinate if the vertical coordinate of the edge point lies between the vertical coordinate of the previous edge point and the vertical coordinate of the next edge point by showing traversing the polygon 120 counterclockwise 26 starting with line 121 (Fig. 12), the x value at pel 42 would be stored at the max entry 107 for the y entry 103 at y=11 representing scan line 132 for y=11. (Col 10, lines 53-56 and Fig. 12) For the next scan line 132 of y=12, the value of pel 44 (Fig. 12) would be stored at the maximum entry 107 for the y entry 103 of y=12. (Col 10, lines 56-58 and Fig. 12) This is repeated for each scan line 132. Likewise, traversing the polygon 120 down from vertex 2, the minimum value for a pel 130 at a scan line 132 would be stored in the minimum entry 106 for the corresponding y entry 103. (Col 10, lines 58-62 and Fig. 12) It should be noted that repeating for each scan line encompasses edge points.

Regarding claim 21, Beauregard teaches said method wherein, in the step of filling the closed region, the filling line segments recorded in the line segment linked

lists are filled individually by showing traversing the polygon 120 counterclockwise 26 starting with line 121 (Fig. 12), the x value at pel 42 would be stored at the max entry 107 for the y entry 103 at y=11 representing scan line 132 for y=11. (Col 10, lines 53-56 and Fig. 12) For the next scan line 132 of y=12, the value of pel 44 (Fig. 12) would be stored at the maximum entry 107 for the y entry 103 of y=12. (Col 10, lines 56-58 and Fig. 12) This is repeated for each scan line 132. Likewise, traversing the polygon 120 down from vertex 2, the minimum value for a pel 130 at a scan line 132 would be stored in the minimum entry 106 for the corresponding y entry 103. (Col 10, lines 58-62 and Fig. 12)

Claim 22 is similar in scope to claim 21 and thus is rejected under similar rationale.

Claims 2-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauregard (5710578) in view of Shiraishi (5903276).

Considering Claim 2, Beauregard teaches inserting the intermediate point into the path linked list if the intermediate point exists between the edge point and the previous edge point as taught in the previous paragraphs of this office action. Beauregard also teaches inserting edge point to the end of the path linked list if the edge point is not the last edge point on the contour by showing traversing the polygon 120 counterclockwise 26 starting with line 121 (Fig. 12), the x value at pel 42 would be stored at the max entry 107 for the y entry 103 at y=11 representing scan line 132 for y=11. (Col 10, lines 53-56 and Fig. 12) For the next scan line 132 of y=12, the value of

pel 44 (Fig. 12) would be stored at the maximum entry 107 for the y entry 103 of y=12. (Col 10, lines 56-58 and Fig. 12) This is repeated for each scan line 132. Likewise, traversing the polygon 120 down from vertex 2, the minimum value for a pel 130 at a scan line 132 would be stored in the minimum entry 106 for the corresponding y entry 103 (Col 10, lines 58-62 and Fig. 12). It would have been obvious to one of ordinary skill in the art at the present time the invention was made to insert an edge point to the end of the path link list as the polygon is being traversed counterclockwise because traversing along the polygon and storing a max entry for each scan line as taught by Beauregard will incorporate storage of points at the edge. However Beauregard fails to explicitly teach determining a line flag of the edge point according to the relative position between the edge point and the previous edge points, wherein the line flag is of a first value if the line formed by the edge point and the previous edge is horizontal, of a second value if the line is vertical and of a third value if the line is slanted. This is what Shiraishi teaches. Shiraishi teaches two coding schemes are provided in Fig. 19, as indicated by a flag L taking a value 0 or 1. (Col 11, lines 34-36 and Fig. 19) One of these two coding schemes is used depending on a direction of a given polygon edge. (Col 11, lines 36-37 and Fig. 19) Two flags M and L are provided for each of the directions of polygon edges, and the flag L is used in Fig. 19 for determining the coding scheme. (Col 11, lines 40-42) Furthermore Shiraishi teaches by using the combinations of the slope code and the intersection code, tables for obtaining the area size based on these two codes are calculated. (Col 11, lines 59-61) Figs 22A and 22B are the tables for obtaining the area size based on the slope code and the intersection

code. (Col 11, lines 61-63) Lastly Shiraishi teaches these tables can be used for an edge of **any direction** by using the two flags M and L. (Col 12, lines 25-26) It should be noted that Shiraishi teaches these flags are used for edges of any direction and therefore apply for edges of horizontal, vertical and slanted position (recall from geometry a vertical line is a 90 degree slant and a horizontal line is a 180 degree slant). Therefore it would be obvious to one of ordinary skill in the art at the time the present invention was made to combine the utilization of a line flag formed by edge point and previous edge direction as taught by Shiraishi with a method of filling a closed region as taught by Beauregard in order to calculate an area occupied by a polygon in a given dot (Col 11, lines 38-40).

Regarding claim 3, Beauregard teaches said method wherein there is an intermediate point between the edge point and the previous edge point as taught in the previous paragraphs of this office action. However Beauregard fails to explicitly teach if intermediate points not inserted if line flag of the edge point is of the first value. Nevertheless Shiraishi teaches two coding schemes are provided in Fig. 19, as indicated by a flag L taking a value 0 or 1. (Col 11, lines 34-36 and Fig. 19) One of these two coding schemes is used depending on a direction of a given polygon edge. (Col 11, lines 36-37 and Fig. 19) Two flags M and L are provided for each of the directions of polygon edges, and the flag L is used in Fig. 19 for determining the coding scheme. (Col 11, lines 40-42) Therefore it would be obvious to one of ordinary skill in the art at the time the invention was made to combine the utilization of a line flag of edge point of “first value”, for instance either flag M or L, as taught by Shiraishi with a

method of filling a closed region as taught by Beauregard in order to calculate an area occupied by a polygon in a given dot (Col 11, lines 38-40).

Regarding claim 4, the limitations are similar in scope to a combination of claims 2 and 3 and thus rejected under similar rationale as those claims. However, the only minute difference in claim 4 is the utilization of inserting the end of the path-linked list in ascending order of vertical coordinates. Nevertheless, it is inherent to the said method to insert data points onto a link list in ascending order or any other appropriate arrangement in order to not incorporate unpredictability and randomness and therefore facilitate in a proper filling method.

Claims 5-7 and 9-11 are similar in scope to claim 4 and thus, rejected under similar rationale.

Regarding claim 8, Neither Beauregard or Shiraishi explicitly teach a filling method where the intermediate points are obtained from a linear equation formed by the edge point and the previous edge point. However it is obvious to one of ordinary skill in the art that forming a line from one edge point to a previous edge point will produce a linear equation because any equation of a line can be found by knowing at least two points on the line, which in this case would be the endpoints or edges. Therefore it is well known in mathematics that once the equation of the line is known, any point on that line would be known through substitution of coordinates.

Conclusion

Any inquiry concerning this communication or earlier communications from examiner should be directed to Kevin K Xu whose telephone number is 571-272-7747. The examiner can normally be reached on Monday-Friday from 8:30 AM – 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778.

Information regarding the status of an application may be obtained from Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EB) at 866-217-9197 (toll-free).

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